US006907633B2

(12) **United States Patent**
Paolini et al.

(10) **Patent No.: US 6,907,633 B2**
(45) **Date of Patent: Jun. 21, 2005**

(54) **ZONING OF INFLATABLE BLADDERS**

(75) Inventors: **Raymond P. Paolini**, Orchard Park, NY (US); **Roland E. Flick**, Elma, NY (US)

(73) Assignee: **Gaymar Industries, Inc.**, Orchard Park, NY (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 20 days.

(21) Appl. No.: **10/435,818**

(22) Filed: **May 12, 2003**

(65) **Prior Publication Data**

US 2003/0213067 A1 Nov. 20, 2003

Related U.S. Application Data

(60) Provisional application No. 60/381,187, filed on May 16, 2002.

(51) **Int. Cl.**[7] **A47C 27/10**
(52) **U.S. Cl.** **5/713**; 5/710; 5/935
(58) **Field of Search** 5/706, 710, 713, 5/654, 655.3, 935

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,705,429	A	12/1972	Nail	
4,882,800	A	11/1989	Schueler	
5,412,822	A	5/1995	Kelly	
5,901,393	A	5/1999	Pepe et al.	
6,079,070	A	6/2000	Flick	
6,253,401	B1 *	7/2001	Boyd	5/713

FOREIGN PATENT DOCUMENTS

FR	2707874	1/1995
WO	WO 93/24088	12/1993
WO	WO 02/065878 A2	8/2002

OTHER PUBLICATIONS

European search report for European patent application that corresponds to above application—2 pages—prepared Sep. 30, 2003.

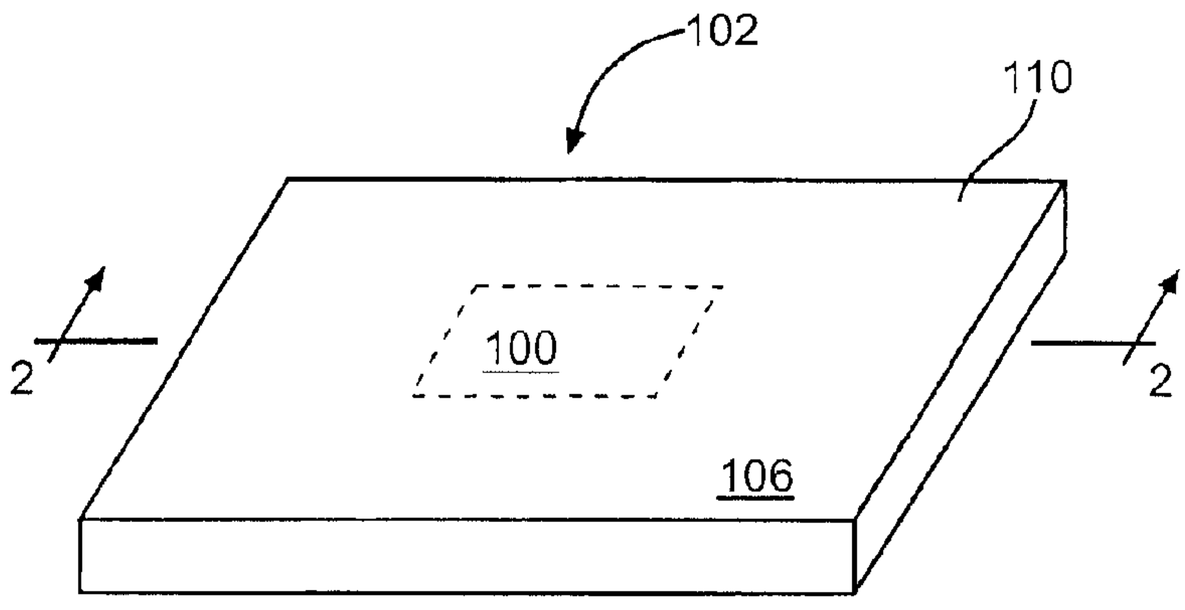
* cited by examiner

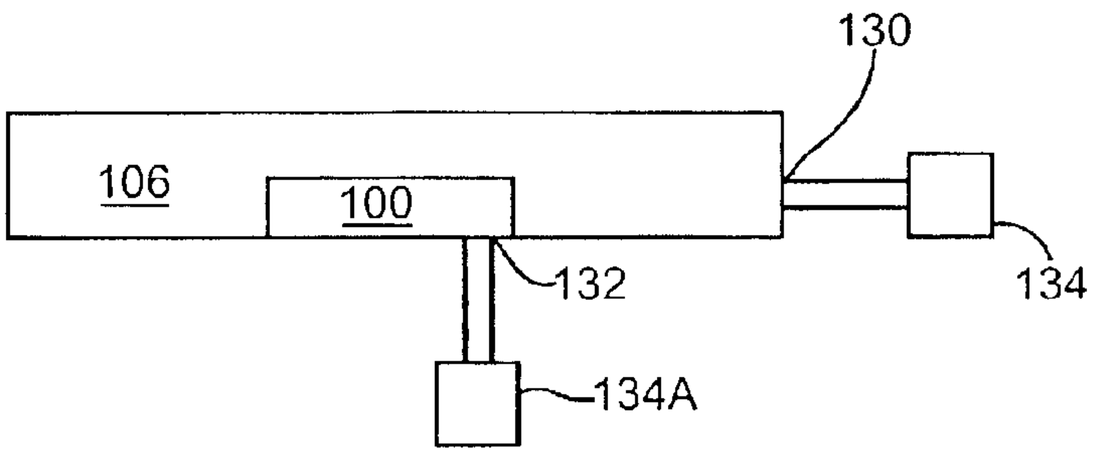
Primary Examiner—Heather Shackelford
Assistant Examiner—Frederick Conley
(74) *Attorney, Agent, or Firm*—Roach Brown McCarthy & Gruber, PC; Kevin D. McCarthy

(57) **ABSTRACT**

The present invention is directed to diminish the material's creep problem found in inflatable bladders. This is accomplished by positioning an anti-creep zone within a bladder. The anti-creep zone is separated from the remainder of the bladder by a fluid barrier. The fluid barrier can have various embodiments that prevent and/or allow predetermined amounts of fluid into the anti-creep zone.

11 Claims, 4 Drawing Sheets





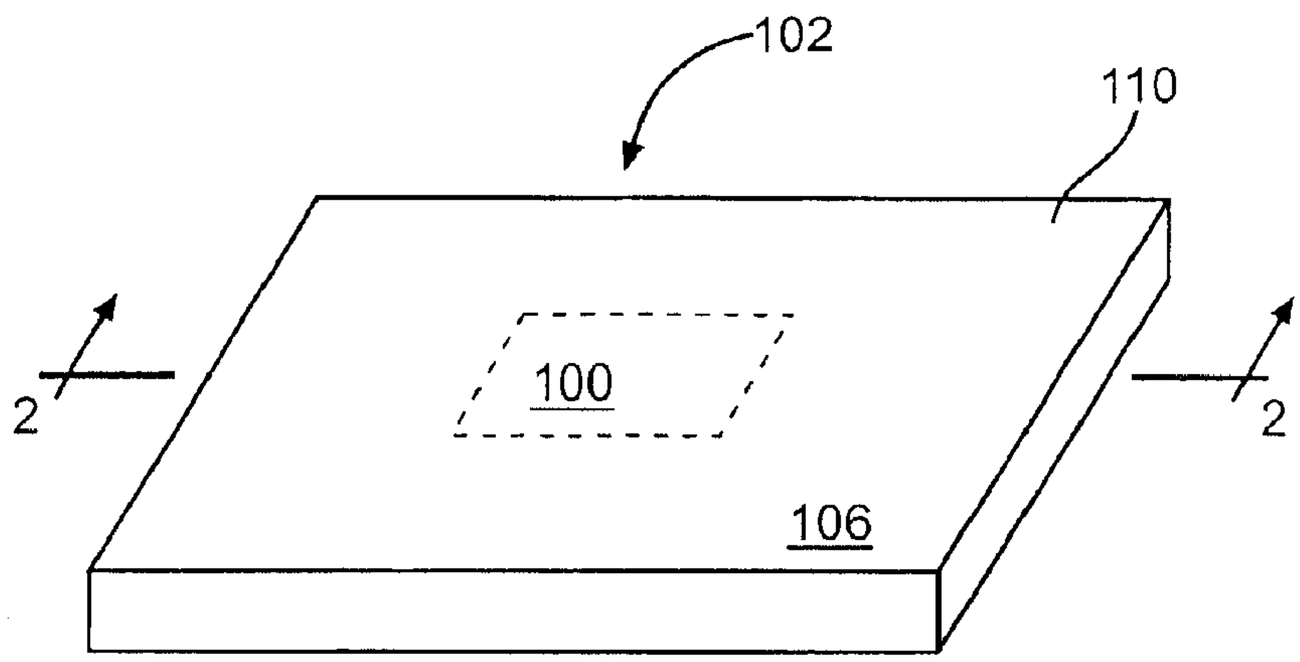


FIG. 1

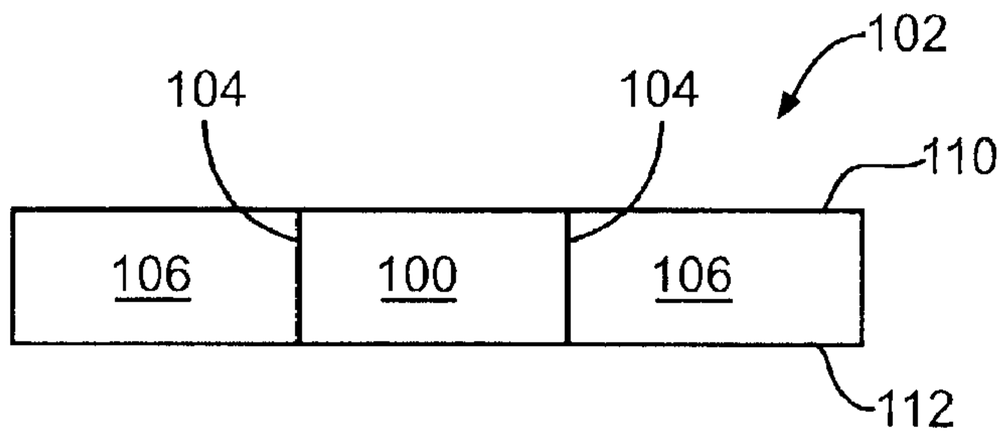


FIG. 2

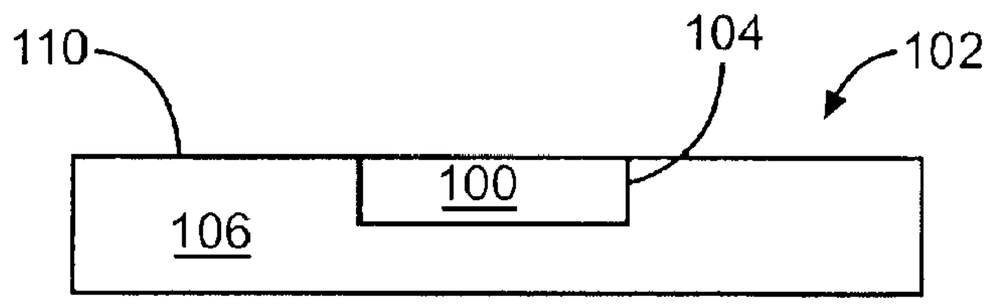


FIG. 3

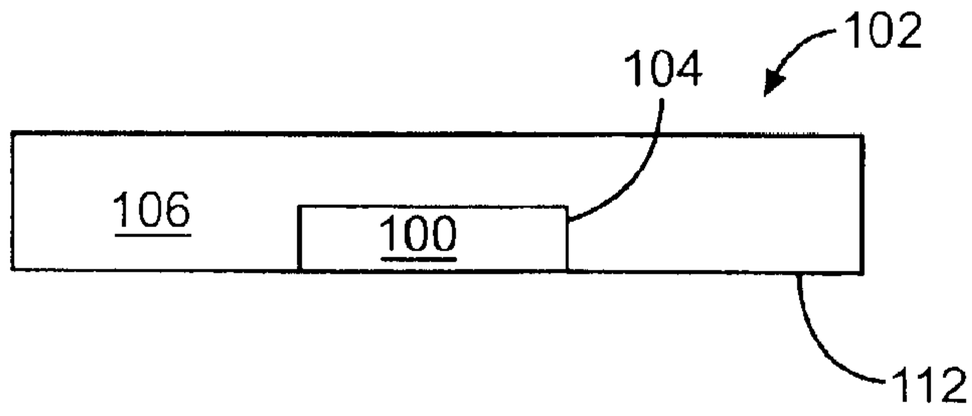


FIG. 4

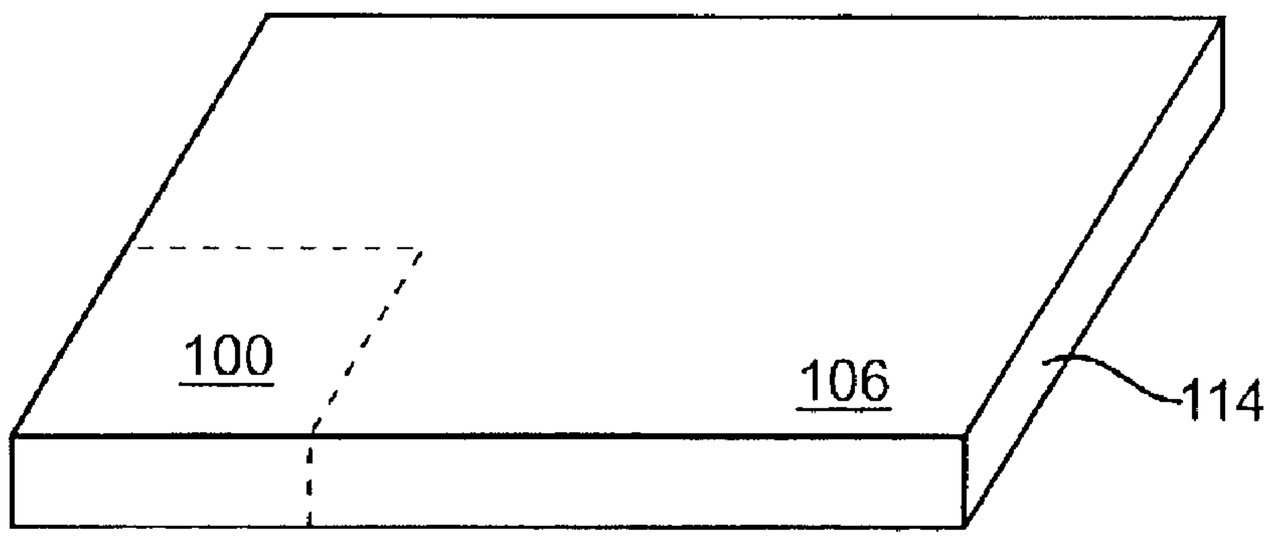


FIG. 5

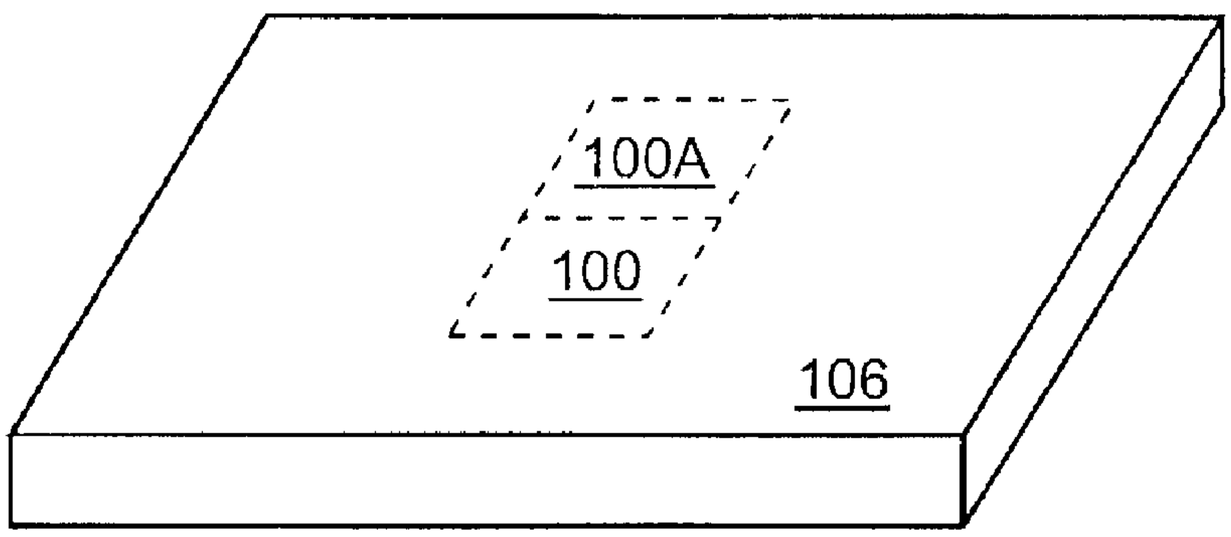


FIG. 6

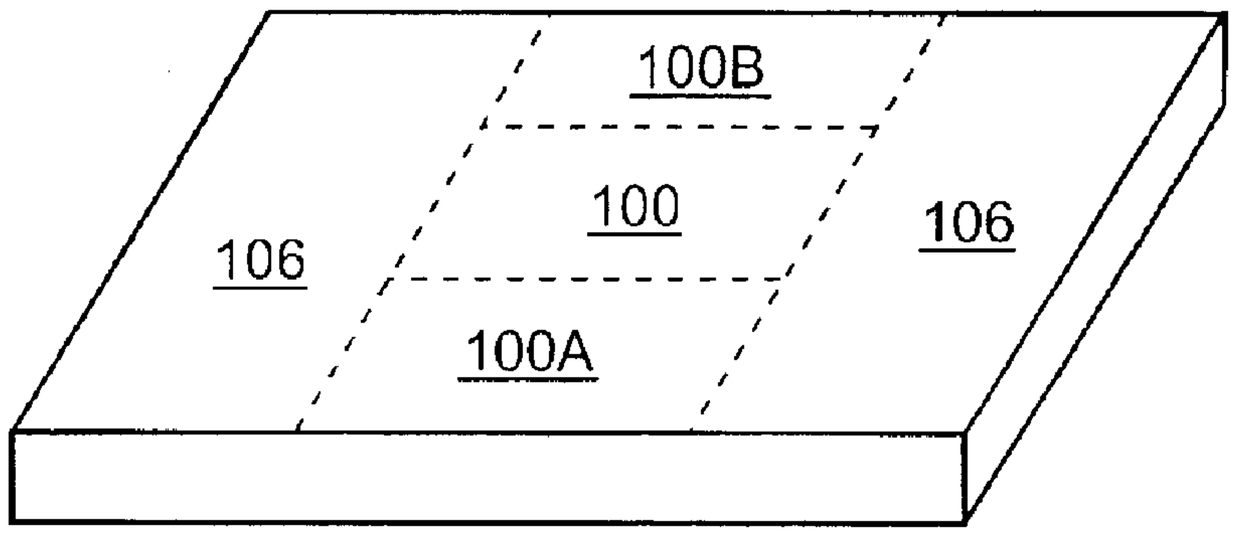


FIG. 7

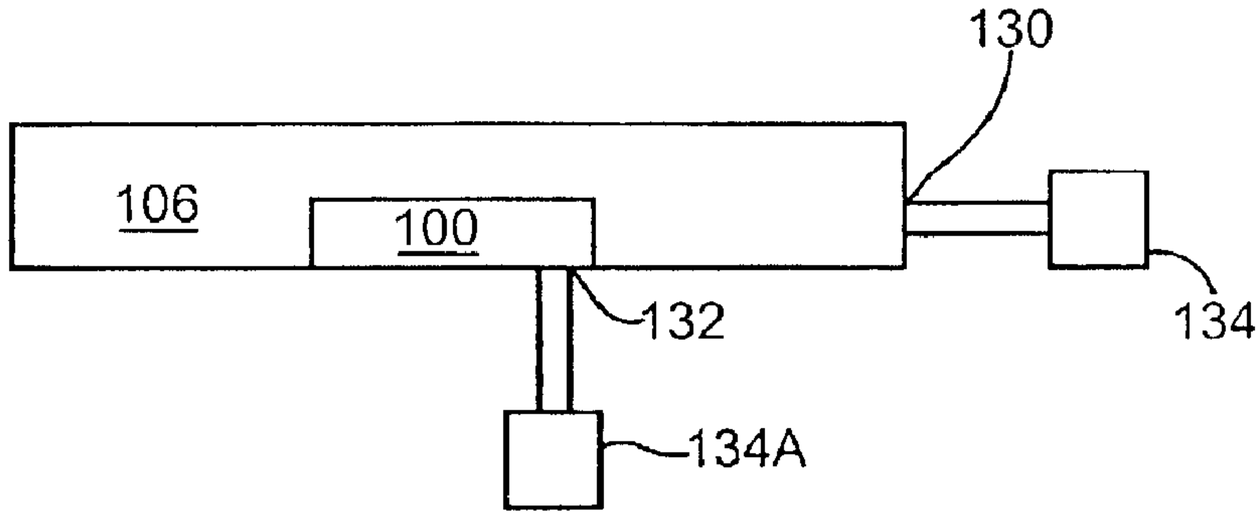


FIG. 8

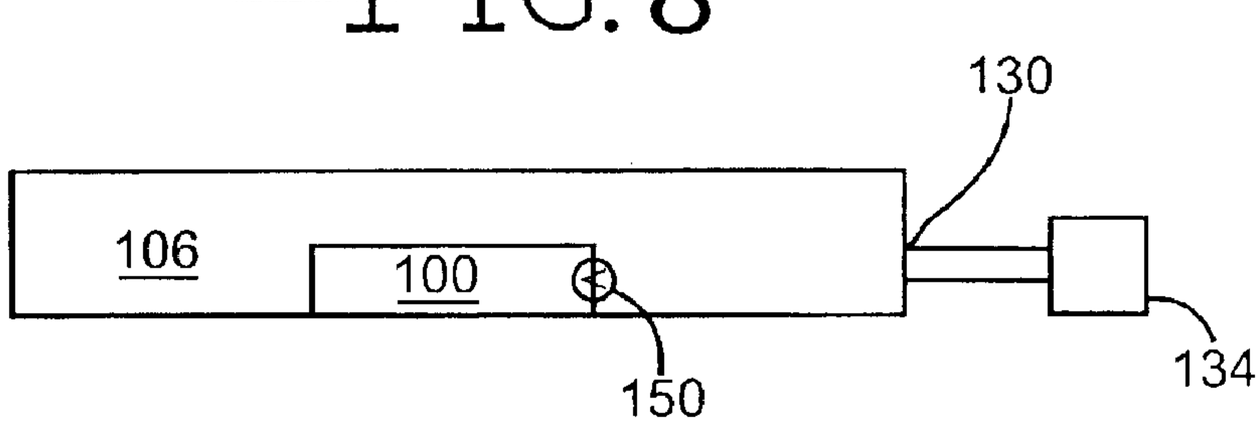


FIG. 9

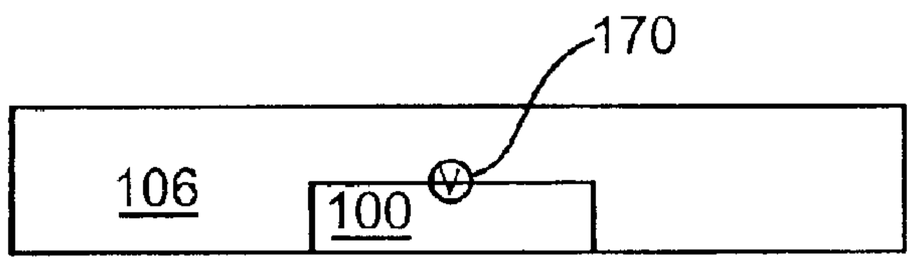


FIG. 10A

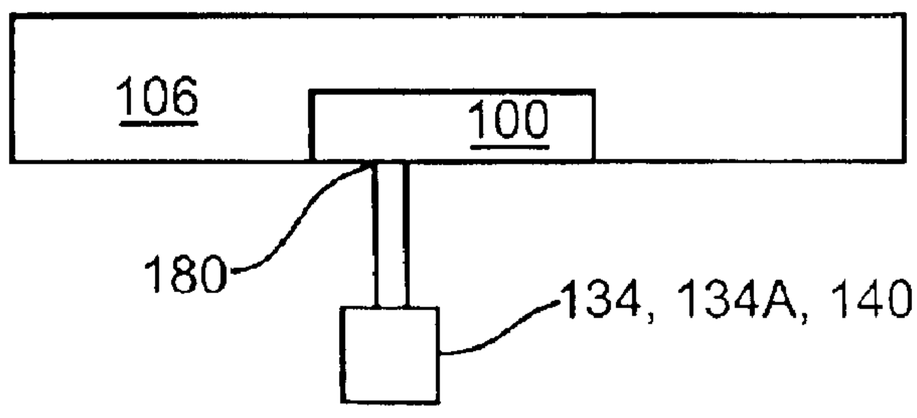


FIG. 10B

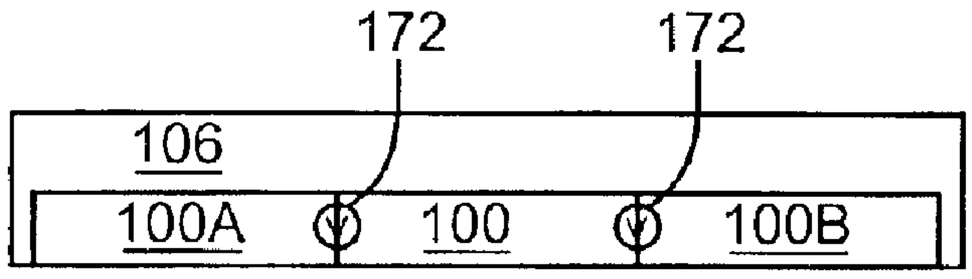


FIG. 10C

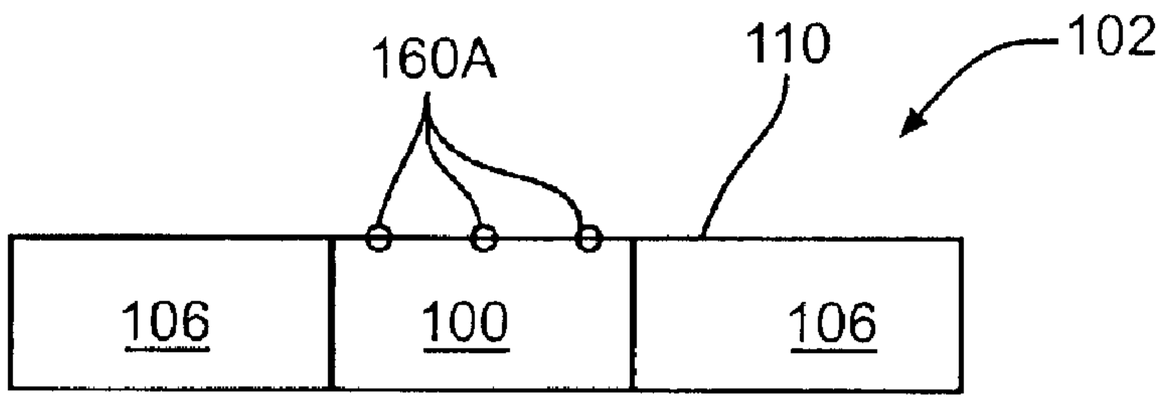


FIG. 10D

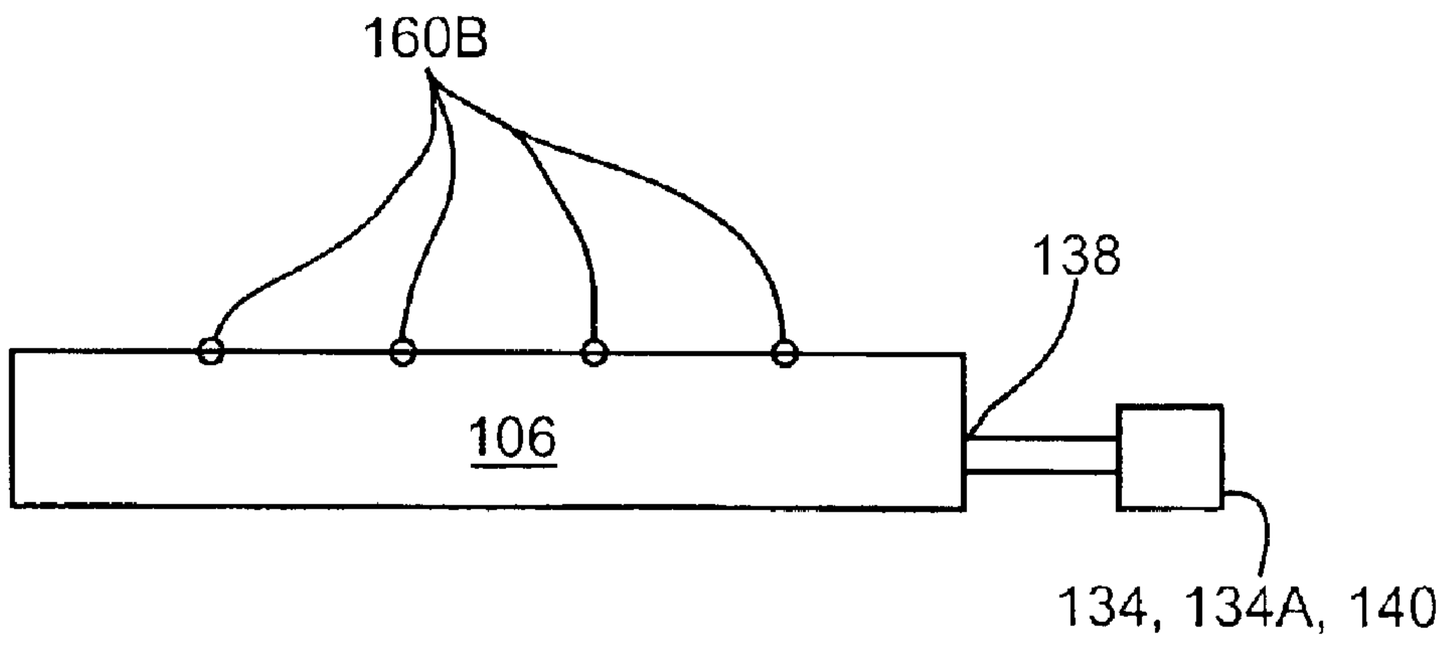


FIG. 11

ZONING OF INFLATABLE BLADDERS

CLAIM OF PRIORITY

This application claims priority to U.S. provisional patent application Ser. No. 60/381,187, filed on May 16, 2002.

FIELD OF THE INVENTION

The present invention relates generally to inflatable cushions, mattresses and pads. In some embodiments, the invention can have alternately inflatable or expandable cells or bladders actuated by a pressure system.

BACKGROUND OF THE INVENTION

The present invention can be used with various types of bladders (or cells) used in inflatable cushions, mattresses or pads. In many cases these cushions, mattresses and pads are therapeutic and used by hospitals, businesses, and residences.

There are various types of cushions, mattresses or pads (collectively referred to as mattresses). Some of these variations are disclosed in commonly assigned U.S. Pat. No. 5,901,393 (Pepe et al.; title: Alternating Pressure Support Pad), and U.S. Pat. No. 6,079,070 (Flick; title: Disposable Inflatable Inclinable Cushion), which are hereby incorporated by reference. Obviously, these patents fail to disclose every type of inflatable mattresses but it does provide a representative sample.

In synopsis, every inflatable mattress has at least one bladder. That bladder can be made of polymeric materials having a top surface capable of receiving an object, a bottom surface that is opposite the top surface, and at least one side positioned between the top and bottom surfaces. In addition, every inflatable bladder is capable of receiving through an inlet a fluid, normally air or an aqueous solution, from a fluid source, normally a pump. From this fundamental understanding of inflatable bladders, the variations of bladders become evident. For example, some bladders (1) have the inlet of the fluid removed to become a self-contained device and (2) retain an inlet to receive fluid to become a dynamic device.

In the latter embodiment, the fluid exits the bladder through at least one outlet. In one version, the fluid exits the outlet through a conduit to return to the fluid source. In other versions the fluid exits the outlet through a conduit to a receiving unit, distinct from the fluid source. Another version has the surface of the bladder having a plurality of apertures designed to release at least a portion of the fluid toward the object lying on the inflatable bladder. Some bladders may have a CPR dump system to release the fluid expeditiously from the bladder.

Obviously, there may be alternative embodiments to these generic descriptions of bladders. In addition, the bladders may have alterations to (1) generate desired fluid flow patterns, (2) obtain desired mattress firmness and (3) allow the bladder adaptability for the mattress system. To obtain such results and others like it, the bladders have predetermined button welds, welds, and slits along welds. In addition, many of these alternative embodiments are embodied in numerous patent applications and patents, and product configurations.

As previously stated, numerous, if not all, inflatable bladders are constructed of some type of film material. The film material can be, for example, vinyl, polyethylene, or combinations thereof. When such film materials are used, the applicants have determined that the ability of the bladder

to support loads for extended periods of time is greatly affected by creep of the material.

Creep occurs when an object, like a human, is placed on the mattress and displaces the air, at least immediately below the object, to the extremities of the bladder. Over time, creeping of the mattresses allows the object to bottom out on the inflatable mattress. Such results are undesirable and need to be minimized.

SUMMARY OF THE INVENTION

The present invention is directed to diminish the material's creep problem found in inflatable bladders. This is accomplished by positioning an anti-creep zone within a bladder. The anti-creep zone is separated from the remainder of the bladder by a fluid barrier. The fluid barrier can have various embodiments that prevent and/or allow predetermined amounts of fluid into the anti-creep zone.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** illustrates an isometric view of the present invention.

FIG. **2** illustrates a cross-sectional view of FIG. **1** taken along the lines **2**—**2**.

FIGS. **3** and **4** illustrate alternative embodiments of FIG. **2**.

FIGS. **5**–**7** illustrate alternative embodiments of FIG. **1**.

FIGS. **8** and **9** illustrate alternative embodiments for providing a fluid to the anti-creep zone and the remainder of the bladder.

FIGS. **10***a*–*d* illustrates alternative embodiments to expel a fluid from the anti-creep zone.

FIG. **11** illustrates embodiments to expel a fluid from the remainder of the bladder.

DETAILED DESCRIPTION OF THE PRESENT INVENTION

The present invention is directed to a modification of bladders used in inflatable mattresses. Applicants admit that the bladder described in the Background of the Present Invention is a generic description of many bladders. This application, however, is not directed to bladders per se, but to what is within the bladders. Excluding fluids, welds, button welds and the like, the interior of a bladder is empty. It is empty because it is designed to have a fluid contained therein. Such designs, as described, above can result in creeping which in turn can result in bottoming out of the object on the mattress. Bottoming out and thus creeping are undesired. Therefore, applicants have modified the bladder design to diminish the possibility of such creeping and bottoming out.

The present invention is directed to inserting at least one anti-creep zone **100** into a bladder **102** as shown in FIG. **1**. At least one fluid barrier **104** separates the anti-creep zone **100** from the remainder of the bladder **106**.

The embodiment illustrated in FIG. **2** clearly illustrates that the fluid barrier **104** extends from the top surface **110** of the bladder **102** that is designed to receive an object thereon, to the bottom surface **112** of the bladder **102**. In addition, the fluid barrier **104** can be of the same or different material as the bladder **102** so long as the material separates the fluid in the remainder of the bladder **106** from the fluid within the anti-creep zone **100**. As illustrated in FIGS. **3** and **4**, the fluid barrier **104** may be interconnected to just the bottom surface **112** (FIG. **4**) or the top surface **110** (FIG. **3**). The fluid barrier

can be attached to the bladder **102** by welding, or any other conventional method to seal a polymeric material to another polymeric material.

Alternatively, the fluid barrier can be attached to at least one of the sides **114** positioned between the top surface **110** and the bottom surface **112**, as illustrated in FIG. **5**. In addition, the anti-creep zone **100**, or a combination of anti-creep zones **100**, **100***a*, **100***b* can be positioned within the bladder **102**, as illustrated in FIGS. **6** and **7**.

FIGS. **8** and **9** illustrate two embodiments in which fluid is provided to the bladder **102**. In each embodiment, a fluid source **134** provides a first fluid into an inlet **130**. The first fluid is then within at least the remainder of the bladder **106**. That embodiment is illustrated in both FIGS. **8** and **9**. The difference between FIGS. **8** and **9** resides in how the anti-creep zone receives its fluid.

As illustrated in FIG. **8**, the anti-creep zone **100** can have its own exterior inlet **132** to receive a second fluid from a second fluid source **134***a*. In reality, the fluid sources **134** and **134***a* can be the same or different, and provide the same or distinct fluids.

Alternatively, FIG. **9** illustrates that the anti-creep zone has an inlet valve **150** that allows the first fluid from the remaining bladder **106** to enter the anti-creep zone. In a preferred embodiment, the inlet valve **150** will only allow the first fluid into the anti-creep zone until the first fluid reaches a predetermined pressure within the anti-creep zone.

Once the bladders **102** are filled to a desired pressure, the exterior inlets **130**, **132** can be sealed off. That way, the bladders illustrated in FIGS. **8** and **9** can become self-contained bladders.

Alternatively, the bladders illustrated in FIGS. **8** and **9** can become dynamic bladders by retaining the exterior inlet (FIG. **9**) or inlets (FIG. **8**). A dynamic bladder is one in which the fluid can at least exit the remainder of the bladder **106**. FIGS. **10***a–d* illustrates different outlet designs for the anti-creep zone **100**. So there is no confusion, the embodiments illustrated in FIGS. **10***a–d* are additional elements that are not illustrated in FIGS. **8** and **9**.

FIG. **10***a* illustrates an outlet valve **170** that allows the fluid contained in the anti-creep zone **100** to exit into the remainder of the bladder **106**. Preferably, the outlet valve **170** will only allow the fluid to exit the anti-creep zone when the fluid within the anti-creep zone exceeds a predetermined pressure. Obviously, the predetermined pressure can be any value determined by the user and/or manufacturer by selecting certain outlet valves **170**.

FIG. **10***b* illustrates that the anti-creep zone **100** can alternatively have an exterior outlet **180**. The exterior outlet allows the fluid to exit the anti-creep zone into the fluid source **134**, **134***a*, or a reservoir **140**.

FIG. **10***c* illustrates interconnected anti-creep zones **100**, **100***a*, **100***b*. At least one valve **172** interconnects each zone **100**, **100***a*, **100***b* to at least another zone, and possibly more. The valve **172** allows a fluid in the anti-creep zones **100**, **100***a*, **100***b* to flow between different zones. In one embodiment, the valve **172** will only allow the fluid to flow to another zone if the fluid exceeds a predetermined pressure in the zone the fluid is leaving from.

FIG. **10***d* illustrates that the anti-creep zone **100** can have a plurality of apertures **160***a*. If such apertures are utilized, the fluid should exit the anti-creep zone **100** through the top surface **110**.

Obviously, the embodiments illustrated in FIGS. **10***a–d* can be incorporated into each anti-creep zone **100**. For example, the valves **172** and **170** can be used in a single anti-creep zone **100**.

FIG. **11** illustrates the possible outlet designs for the remainder of the bladder. One possible embodiment is to have an exterior outlet that exhausts the fluid to the fluid sources **134**, **134***a*, or reservoir **140**. Another embodiment has a plurality of apertures **160***b* positioned on the top surface **110**. That way, the fluid can exhaust and apply a fluid to the object positioned on the mattress.

It is desired that the anti-creep zone be positioned in the mattress in a position that receives the greatest weight of the object. For example, if the bladder was being used as a mattress, the anti-creep zone would be positioned preferably under at least the pelvic region of a human being, if the human was the object. In addition, there can be additional anti-creep zones positioned throughout the bladder, and mattress. These anti-creep zones can be individual zones or interconnected zones.

It has been determined that having at least one creep zone positioned in a bladder decreases the chances of the bladder creeping and the object bottoming out on the bladder. The more anti-creep zones used in a bladder and/or the proper positioning of the zones to receive the greatest weight of the object, diminishes the chances of creeping and bottoming out.

Even though they are not illustrated, the bladders illustrated in the figures can have button welds, welds and/or splits therein. These embodiments can be in the remainder of the bladder **106**, the anti-creep zone and/or the seal between the fluid barrier **104** and the bladder **102**.

The top surface can become the bottom surface by merely flipping the bladder over. Flipping the bladder is standard practice in the industry and does not deviate from the invention.

It should be understood that, while the invention has been described in detail herein, the invention can be embodied otherwise without departing from the principles thereof, and such other embodiments are meant to come within the scope of the present invention as defined by the appended claims.

We claim:

1. An inflatable bladder (a) made of a film material, (b) capable of receiving a first fluid through a first exterior inlet, (c) capable of being used in a mattress system, and (d) having a top surface which is designed to receive an object, a bottom surface that is opposite the top surface and at least one side positioned between the top and the bottom surfaces, comprising:

at least one anti-creep zone defined by an upper surface, a lower surface, and at least one in-between surface positioned between the upper and lower surfaces, having (1) at least a predetermined portion of the at least one in-between surface and (2) the upper surface or the lower surface being fluid barriers that separates the anti-creep zone from the remaining portion of the bladder, capable of containing a second fluid, at least one surface of the anti-creep zone has a valve inlet that allows the second fluid to enter the anti-creep zone when the second fluid exceeds a predetermined pressure, the anti-creep zone is designed not to collapse when a user applies pressure to the bladder and the anti-creep zone to avoid creeping and bottoming out of the bladder, and at least one in-between surface is attached to the bladder surface; and the inflatable bladder has at least one of the following characteristics selected from the group consisting of:

A. the anti-creep zone has a valve outlet for the second fluid that allows the second fluid to exit the anti-creep zone when the fluid exceeds a predetermined pressure;

B. the first and second fluids are two different fluids;

C. the first and second fluid are the same and the valve inlet allows the fluid to enter into the anti-creep zone from the remainder of the bladder;

D. the valve inlet allows the second fluid to enter into the anti-creep zone from a second anti-creep zone; and

E. the anti-creep zone has a second exterior inlet.

2. The inflatable bladder of claim **1** wherein the valve outlet allows the second fluid to exit from the anti-creep zone to a second anti-creep zone.

3. The inflatable bladder of claim **1** wherein the valve outlet allows the second fluid to exit from the anti-creep zone to the remainder of the bladder.

4. The inflatable bladder of claim **1** wherein the valve outlet allows the second fluid to exit from the anti-creep zone to an object outside the bladder.

5. The inflatable bladder of claim **1** wherein the anti-creep zone does not contact the at least one side positioned between the top and bottom surfaces of the bladder.

6. The inflatable bladder of claim **1** wherein the anti-creep zone contacts the at least one side positioned between the top and bottom surfaces of the bladder.

7.The inflatable bladder of claim **1** wherein the first exterior inlet is removable after the bladder is inflated to a desired pressure.

8. The inflatable bladder of claim **1** wherein the first and second fluids are the same, except when the characteristic is item B or C.

9. A method of using an inflatable bladder (a) made of a film material, (b) capable of receiving a first fluid through a first exterior inlet, (c) capable of being used in a mattress system, and (d) having a top surface which is designed to receive an object, a bottom surface that is opposite the top surface and at least one side positioned between the top and the bottom surfaces, comprising:

inflating the bladder with a first fluid to a predetermined pressure;

injecting a second fluid into at least one anti-creep zone positioned within the bladder, at least one anti-creep zone defined by an upper surface, a lower surface, and at least one in-between surface positioned between the upper and lower surfaces, having (1) at least a predetermined portion of the at least one in-between surface and (2) the upper surface or the lower surface being fluid barriers that separate the anti-creep zone from the remaining portion of the bladder, capable of containing a second fluid, at least one surface of the anti-creep zone has a valve inlet that allows the second fluid to enter the anti-creep zone when the second fluid exceeds a predetermined pressure, the anti-creep zone is designed not to collapse when a user applies pressure to the bladder and the anti-creep zone to avoid creeping and bottoming out of the bladder, and at least one in-between surface is attached to the bladder surface; and

the inflatable bladder has at least one of the following characteristics selected from the group consisting of:

A. the anti-creep zone has a valve outlet for the second fluid that allows the second fluid to exit the anti-creep zone when the fluid exceeds a predetermined pressure;

B. the first and second fluids are two different fluids;

C. the first and second fluid are the same and the valve inlet allows the fluid to enter into the anti-creep zone from the remainder of the bladder;

D. the valve inlet allows the second fluid to enter into the anti-creep zone from a second anti-creep zone; and

E. the anti-creep zone has a second exterior inlet.

10. The method of claim **9** wherein the first and second fluids are the same, except when the characteristic is item B or C.

11. The method of claim **9** wherein the fluid barrier does not contact the at least one side positioned between the top surface and the bottom surface.

* * * * *